An Annotated List of the Pteridophytes of Northwestern Ontario

O. E. JENNINGS

During the summers of 1916 and 1917 my wife and I continued our botanical work in northwestern Ontario. We have now spent the major part of five summers in this region, articles having been published in the AMERICAN FERN JOURNAL on the itinerary and pteridophytes collected in 1912, 1913, and 1914. *See* literature cited at the end of this article (6), (7).

It has been thought best to assemble the various collections as well as possible this year, as the amount of material secured on these various trips and the number of localities visited will enable us to publish a fairly comprehensive and complete list of the flora of a considerable part of Ontario lying to the north and northwest of Lake Superior. During 1916 we went again to Sioux Lookout, about two hundred miles northwest of Lake Superior, remaining there over a month and working that region over quite thoroughly. In 1917 we spent the first half of the summer along the line of the Canadian Northern Railway, east of Lake Nipigon, stopping first at Longuelac, a station at the north end of Long Lake, and distant about seventy-five miles east of Lake Nipigon and an equal distance north of Lake Superior. This region is one of little relief, there being much spruce muskeg from which rise the low rounded hills and rolling lands of rounded rocks and glacial soils.

The second stop of 1917 was at Jellicoe, about half way between Longuelac and Lake Nipigon, approximately on the divide between the Hudson Bay and the Lake Nipigon drainage; the region being one with extensive sand-plains (glacial terraces) from which rise rounded rocky hills of considerable size and into which the Blackwater River has excavated a deep and often lake-like channel. There are also numerous smaller

lakes and ponds, those in the sand-plain often being without outlet, other than by seepage.

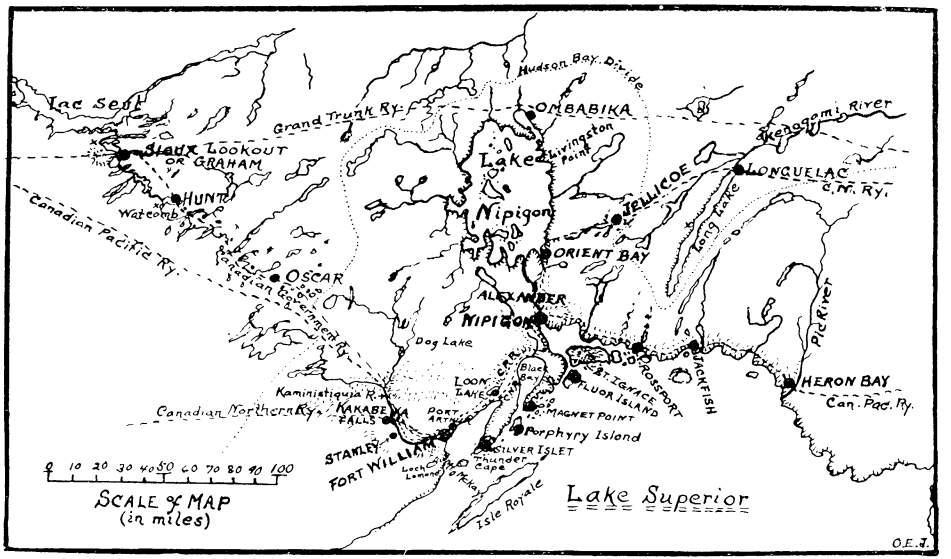
The latter part of the 1917 trip was spent along the Canadian Government Railway, northwest of Lake Superior, first at Hunt, and then back to Oscar, about one hundred and sixty-eight and one hundred and eight miles, respectively, northwest of Fort William. At Hunt the country consists of morainal knolls and ridges, the deeper hollows being occupied by muskegs or by lakes, of which there are a great number, large and small. At Oscar much the same topography prevails, but with more sand and gravel in the morainal deposits and with some considerable areas of sandy plain. Here also the lakes are very numerous, and, as at Jellicoe, some of those in the sand-plains are without outlets.

To briefly summarize: The localities visited during the five seasons have included, for usually about two weeks' stay each, the following main stops (or bases) along the north shore of Lake Superior: Heron Bay, near the mouth of the Pic River; Rossport; Nipigon; Fluor Island; Magnet Point; Porphyry Island; Silver Islet, Thunder Cape; and Fort William; and the following inland stations: Longuelac, north end of Long Lake; Jellicoe; Orient Bay, at the south end, and Ombabika Post at the north end of Lake Nipigon; Slate River, about three miles southeast of Stanley and fifteen miles west of Fort William; Loon Lake; Oscar; Hunt; and Sioux Lookout, or Graham. Many other localities, often at some distance from these bases, were visited briefly, such as St. Ignace Island; Jackfish; Kakabeka Falls; first rapids of the Kenogami; Pelican Falls, south side of Lac Seul, etc.; while the region within a radius of five to ten miles of the main bases was explored pretty thoroughly. The explorations have thus covered a territory of about 200 miles along the north shore of Lake Superior, and many of the islands and peninsulas

of that part of the lake, while, inland, the localities extended to the north end of Lake Nipigon, about 110 miles north of Lake Superior, and from Long Lake, east of Lake Nipigon, to Sioux Lookout, west, a distance of about 275 miles, altogether extending over a region of perhaps twice the size of New Jersey.

The distribution of plants in this part of Canada is highly interesting and deserves to be better known. Like the neck of an hour-glass, it constitutes a very much narrowed connecting link between the wider eastern and western distribution areas of many northern species, or perhaps between species of close relationship. In the latter category may be mentioned the Salmon Berry (*Rubus parviflorus*), a western species reaching the northern shore of Lake Superior and closely related to the eastern *Rubus odoratus*, which reaches Michigan to the west. Similarly the western Devil's Club (*Fatsia horrida*) meets in this region the eastern Bristly Sarsaparilla (*Aralia hispida*). The same principle seems to apply with regard to some of the pteridophytes, as noted farther on in this article in the list of species.

In the following list of our collections the writer has attempted to note also the localities in which other collectors have found the various species. The frequent references to Macoun refer to the Catalogue of Canadian Plants by John Macoun (*See* literature cited.—9). Our own records are all substantiated by one or more sheets of specimens in the Herbarium of the Carnegie Museum, and many of these are also represented by duplicates in the Herbarium of the American Fern Society. Most of the specimens have been identified, or at least verified, by Prof. L. S. Hopkins to whom I express my grateful appreciation. The general ranges mentioned for a number of the species listed have been based mainly on the last editions of Gray's *Manual* and Britton & Brown's *Illustrated Flora*.



SKETCH MAP OF THE REGION EXPLORED IN 1912–1917

The heavy round dots indicate the main stopping places. Only the larger lakes and streams have been indicated, no attempt having been made to show the hundreds of smaller lakes and ponds.

LYCOPODIALES

1. LYCOPODIUM SELAGO L. This interesting species was reported by Macoun for high exposed rocks ten miles south of Otter head, on the northeastern shore of Lake Superior, also north of that locality, while, in 1912, Mr. Daily and I collected it on Jackfish Island, along the middle northern shore of the lake, about sixty-five miles northwest of Macoun's locality. This island had a deep covering of Sphagnum and other mosses together with Cranberries, *Empetrum nigrum*, *Vaccinium uliginosum*, etc., altogether a remarkable association of far northern species.

2. LYCOPODIUM LUCIDULUM Michx. John Macoun reports this as very common through northern Ontario. Our stations are in protected valleys along streams or shores: Orient Bay, south end of Lake Nipigon; south of Nipigon; base of Rabbit Mt., near Stanley; and along Lake Superior at Maloney's Harbor, Magnet Point, and channel at Porphyry Island. Our collections do not include the species from the northern end of Lake Nipigon nor our inland stations either east or west of there.

3. LYCOPODIUM POROPHYLLUM Lloyd & Underw. Margin of little pond, west side of Surprise Lake, Thunder Cape. This is the most northwesterly station reported for the species, which ranges from Newfoundland and Quebec to Wisconsin and south to Missouri and South Carolina.

4. LYCOPODIUM INUNDATUM L. This species, with a range from Newfoundland to New Jersey and west to Washington and Alaska in cold bogs and on cold sandy shores, was noted by Agassiz along the north shore of Lake Superior on his famous cruise in 1848, but it, evidently, has not often been found in this region. Our only collection of it was on a compact, sandy, open, but somewhat boggy bank of a little creek three miles south of Oscar, along the Canadian Government Railway one hundred and five miles northwest of Fort William.

5. LYCOPODIUM ANNOTINUM L. Usually in well drained mixed woods, but apparently rather indifferent as to substratum, being found on rocky shores, sand-hills, or glacial boulder morainal deposits, occasionally even penetrating spruce-sphagnum muskegs. Longue-lac, north end of Long Lake; Jellicoe; Ombabika, north end of Lake Nipigon; Sioux Lookout Knob, Graham; Hunt; Oscar; middle of western shore of Long Lake; Virgin Falls, south end Lake Nipigon; Rossport; Jack-fish; Nipigon; Little Fluor Island; Porphyry Island; Silver Islet, Thunder Cape; Loon Lake; Fort William; Stanley.

LYCOPODIUM CLAVATUM AT SILVER ISLET
(Photograph by O. E. Jennings, Aug. 2, 1914)

5*a*. LYCOPODIUM ANNOTINUM var. PUNGENS Desv. In dense spruce-sphagnum bog at Heron Bay and at Pay's Plat, along the northern shore of Lake Superior.

6. LYCOPODIUM CLAVATUM L. Usually on thin sandy or rocky soils; in spruce woods on rocky hills and cliffs or in mixed woods of birch, aspen, etc., at a lower ele-

vation. Heron Bay; Orient Bay, south end of Lake Nipigon; Nipigon Palisades; Thunder Cape; Loch Lomond, Fort William; Loon Lake; Rabbit Mt., Stanley; Oscar; English River Falls, Hunt; Sioux Lookout. Macoun refers to this species as common in eastern and northwestern Ontario.

6*a*. LYCOPODIUM CLAVATUM var. MONOSTACHYON Grev. & Hook. On rocky outcrop at side of muskeg, Conmee, twenty miles north of Nipigon.

6*b*. LYCOPODIUM CLAVATUM var. MEGASTACHYON Fern. & Biss. In spruce-birch woods on clay-sand-boulder soil one mile east of Sioux Lookout. The spikes in these specimens are from 3–5 cm. long, the peduncles up to 11 cm. long. The range of this variety is given as Quebec and Cape Breton Island to Connecticut, and west, locally, to northern Michigan (Rhodora **12**: 50–55. March, 1910), hence our locality is an extension of range to the northwest.

7. LYCOPODIUM OBSCURUM var. DENDROIDEUM (Michx.) D. C. Eaton. Mostly on rocky knobs, bluffs, and talus slopes in spruce woods, but extending also to sandy or clayey morainal deposits and sandy shores. Longuelac, Long Lake; Jellicoe; Orient Bay, Lake Nipigon; east side of Lake Helen; Palisades, Nipigon; Alexander Portage, Nipigon River; Rossport; Sleeping Giant Mt., Thunder Cape; Mt. McKay, Fort William; Oscar; Hunt; Sioux Lookout Knob, Graham. Macoun says of *obscurum:* "Very common in the central counties of Ontario and westward around Lake Superior."

8. LYCOPODIUM SITCHENSE Rupr. Reported by Macoun from Magpie River, north of Lake Superior. The general range is from Labrador and Quebec to northern New England and New York, and from Alaska to Washington, the Lake Superior station forming the intermediate connecting link between these eastern and western regions.

9. LYCOPODIUM SABINAEFOLIUM Willd. Eastern Quebec to Vermont and New York. Also reported from Magpie River, north of Lake Superior.—Macoun.

10. LYCOPODIUM COMPLANATUM L. Very few of the specimens collected in the Lake Superior region seem to be of the species, most of them being more typical of the variety *flabelliforme*. The following are probably referable to the species: Longuelac, north end of Long Lake; Jellicoe; Little Fluor Island; Tee Bay, Thunder Cape.

10*a*. LYCOPODIUM COMPLANATUM var. FLABELLIFORME Fernald. On rocky knobs and bluffs with spruce, or lower in aspen or Banksian pine woods. Middle western shore of Long Lake; Nipigon Palisades; Orient Bay, south end of Lake Nipigon; Silver Islet Harbor, Thunder Cape; Graham. Under *complanatum*, Macoun notes: "Very common in cool woods throughout northern Ontario and westward to Lake Nepigon and Kakabeka Falls, Ont., and Swan Lake, Man." these localities probably referring mainly to the more recently described var. *flabelliforme*.

10*b*. LYCOPODIUM COMPLANATUM forma WIBBEI (Haberer) Clute. The range given for this form is northern Vermont and central New York (Gray's Manual), but among our specimens there have been referred to it the following collections: Orient Bay, south end of Lake Nipigon; Silver Islet Harbor, Thunder Cape; and Sioux Lookout.

11. LYCOPODIUM TRISTACHYUM Pursh. With Banksian and red pine on steep gravel ridge (esker) about one and one-half miles north of Watcomb, Can. Gov. Ry., about one hundred and sixty-one miles northwest of Fort William, Aug. 24, 1917. In size and appearance these specimens match almost identically *L. tristachyum* as collected by E. J. Winslow at Hartland, Vermont, July 5, 1910. The reported distribution for this species

is northern Maine to Delaware and south in the mountains to North Carolina. Also Lake Superior. The Watcomb station is thus a notable northwesterly extension of range.

12. SELAGINELLA RUPESTRIS (L.) Spring. On exposed rocks and cliffs, mostly along shores. Reported from New England and Ontario to Georgia and the middle West. In the Lake Superior region Agassiz reported it for the north shore of the lake and Macoun for the east coast of Lake Nipigon. Our collections are from: Heron Bay; Rossport; Nipigon; Livingston Point, n. e. shore of Lake Nipigon; shores of Pelican Lake and pockets at top of Sioux Lookout Knob, Graham, these latter records being perhaps the most northwestern reported for the species.

13. SELAGINELLA SELAGINOIDES (L.) Link. This circumboreal species extends south in North America to New Hampshire, Michigan, and Colorado. Noted by Macoun as "Very common along the north shore of Lake Superior and shores of Lake Nepigon," but collected during our five seasons in that region twice: Under alder fringe at edge of Maloney Harbor, Magnet Point, Lake Superior; and at mouth of cold springs in flat sandy-marly bog, margin of small lake at Jellicoe.

14. ISOETES BRAUNII Dur. (*I. echinospora* var. *Braunii* (Dur.) Engelm.) On open sandy clay or gravel bottoms of fairly quiet but not stagnant water, at a depth of three inches to two feet. East shore of Orient Bay, Lake Nipigon; near English River Falls and shore of Jarvis Lake, Hunt, Can. Gov. Ry. This is mainly a northern species, but ranging south to Pennsylvania in the east and to California in the west. Our specimens are, however, possibly of an undescribed species or variety.

EQUISETALES

15. EQUISETUM ARVENSE L. Mostly on sandy shores or sandy glacial terraces: Rossport; Nipigon; Longuelac, north end of Long Lake; Fluor Island and Magnet Point, Lake Superior; Stanley.

15*a*. EQUISETUM ARVENSE var. CAMPESTRE Schultz. On gravelly island at lower end of rapids, Nipigon, and (fine fruiting specimens) on sand-gravel railroad embankment, C. N. R., east of Longuelac, north end of Long Lake.

15*b*. EQUISETUM ARVENSE var. DIFFUSUM A. A. Eaton. Sandy strand, Orient Bay, and along trail, Ombabika Post, Lake Nipigon; wet sawdust along shore of lake at Hunt, C. G. Ry.

When our material was gotten together it became apparent that the more typical *arvense* was represented only from the Lake Superior and Long Lake collections while, to the northwest, around Lake Nipigon and west of there, only the varieties were represented. Although I can not state definitely, I do not believe that the typical *arvense* occurs, at least commonly, in the latter districts, or it would have been collected.

16. EQUISETUM PRATENSE Ehrh. With a general range from Nova Scotia and Quebec to Alaska and south to the northern U. S., this is reported for the shores of Lake Nipigon and Lake Superior by Macoun, and our collections include it from mixed woods on glacial till at Longuelac, north end of Long Lake. Certainly not common in western Ontario.

17. EQUISETUM SYLVATICUM L. Restricting this name to the plants with shorter and more recurved branches, our specimens are from: Heron Bay; Pay's Plat; Jackfish; Porphyry Island; Longuelac; Stanley; and Oscar. Mostly in spruce-sphagnum bogs, but on old sand dunes at Stanley.

17*a*. EQUISETUM SYLVATICUM var. CAPILLARE (Hoffm.) Milde. Mostly in deep spruce-balsam woods on moist, but not too boggy, soil, but also on various other habitats, such as burned over glacial till or granite, or even muskeg. Rapids on Kenogami River, seven miles below Longuelac; Jellicoe; Lake Helen, north of Nipigon; Orient Bay and Ombabika Post, Lake Nipigon; Porphyry Island, Lake Superior; Mt. McKay and Crystal Lake, south of Fort William; Hunt; Sioux Lookout.

18. EQUISETUM PALUSTRE L. This widely distributed species, extending from Newfoundland to Alaska and south to New York, Illinois, and Arizona, is distinctly rare in the district explored. Macoun reports it from the east side of Lake Nipigon, our collections not including it.

19. EQUISETUM LITORALE Kuehl. On wet sandy shores from New Brunswick to Pennsylvania, Ontario, Minnesota and west to British Columbia. Reported by Macoun at Little Flat Rock Portage, south of Lake Nipigon. Our collections include it from Longuelac; Fort William; and North Ombabika Peninsula, north end of Lake Nipigon.

20. EQUISETUM FLUVIATILE L. (*E. limosum* L.) This widely distributed species occurs in shallow waters, swamps, and bogs; in open shallow water with a sandy bottom often forming large areas of dense and practically pure associations. Our collections include it from Longuelac; Fort William; Hunt; Nipigon; Lake Jessie, twenty miles north of Nipigon; Orient Bay, south end of Lake Nipigon; and (in boggy spruce-sphagnum woods) at Ombabika, north end of Lake Nipigon.

21. EQUISETUM LAEVIGATUM A. Braun. This species, occurring from New Jersey to Ontario, North Carolina, Mexico, and British Columbia, is reported but once in western Ontario, based on our collection along the boggy margin of the Nipigon River, below Nipigon, June 30, 1912.

22. EQUISETUM HIEMALE var. INTERMEDIUM A. A. Eaton. This North American variety of *E. hiemale*, ranging from Connecticut to Michigan, Texas and California, occurs in our collections from: Open upper beach, Orient Bay, Lake Nipigon; shore of little lake in sand-plain, Jellicoe. So far as known this is a considerable extension of range to the northwest.

23. EQUISETUM VARIEGATUM Schleich. Reported for "Sands, Lake Nepigon."—Macoun. Our collections are best referred to the following variety:

23*a*. EQUISETUM VARIEGATUM var. JESUPI A. A. Eaton. The reported general range of this variety is: Quebec and Ontario, south to Connecticut and Illinois (Gray's Manual). It was found by us on a sandy beach, Pelican Lake, Sioux Lookout, and at Sandy Point, Orient Bay, Lake Nipigon. The specimens from the latter place were reported in the earlier list as *E. hyemale* L., but further study has convinced the writer that they are *E. variegatum*, var. *Jesupi*. (See A. A. Eaton, Fern Bull. **12:** 23–25. 1904.) Under *ramosissimum* Macoun reports an *Equisetum* from Speke's Point, southeastern Lake Nipigon, which from his notes is probably to be referred to *Jesupi*. The variety *Jesupi* is evidently a hybrid between *E. variegatum* and *E. hiemale* (Ruth Holden. The Anatomy of a Hybrid Equisetum. Am. Journ. Bot. **2:** 225–237. Pls. V-VIII. May, 1915.)

23*b*. EQUISETUM VARIEGATUM var. JESUPI forma MULTIRAMEUM Blake. Specimens with slender upper branches and thus referable to Blake's form were growing with the var. *Jesupi* at Sioux Lookout.

24. EQUISETUM SCIRPOIDES Michaux. Ranging from Pennsylvania and Illinois northwards to Labrador and British Columbia, this species is reported by Macoun as very common throughout northern Ontario, and was collected by us as follows: spruce-sphagnum bog at

head of Ombabika Bay, Lake Nipigon; south shore of North Ombabika Peninsula; Orient Bay, south end of Lake Nipigon; *Thuja-Alnus* thicket, shore of lake at Jellicoe.

PITTSBURGH, PA.

(To be continued)

A Vermont Fern Garden

HAROLD GODDARD RUGG

When I first became interested in ferns, my interest was largely in the herbarium specimens, but soon I began to desire to see the growing plant and to be able to study its growth. In the years of my collecting I have seen growing in their natural habitat practically all of the ferns credited to Vermont, and at some time or other I have had plants of them growing in my fernery at Proctorsville, Vermont. In some cases, however, the rarer ferns have survived but a year or two.

An ideal location for a fernery is a northern exposure, possibly the north side of a house. My fernery in such a location has plenty of shade, the ground retains its moisture longer than in other locations and the soil is free from tree roots. The soil is ordinary loam, but to this I add leaf mould.

I have succeeded with all the ordinary ferns, including some which like *Woodwardia virginica* L. (Sm.) need rather moist conditions. My *Woodwardia* however has never produced fertile fronds. *Woodwardia areolata* (L.) Moore, not a native of Vermont, plants of which may be purchased from two of our dealers, does well and has fruited nearly every year.

One of the ferns I was most anxious to have growing in my fernery was *Lygodium palmatum* (Bernh.) Sw. I sent for plants of this several times to two nursery-